

REMARKS

By this Amendment, Claims 1-13 are canceled, and Claims 14, 16, 17, 21, 26, 27, 34 and 35 are amended, leaving Claims 14-17, 19-36 and 39 pending. Reconsideration of the June 6, 2003 Official Action is respectfully requested.

1. Telephonic Interview

Applicants thank Examiner Uhler for the courtesies extended to Applicants' undersigned representative during the September 4, 2003, telephonic interview. The substance of the interview is incorporated in the following remarks.

2. Rejection of Claims 14, 19, 20 and 34 under 35 U.S.C. §103

Claims 14, 19, 20 and 34 stand rejected under 35 U.S.C. §103(a) over EP0845545 to Ding et al. ("Ding"). The reasons for the rejection are stated at numbered paragraphs 3-20 of the Official Action. The rejection is respectfully traversed.

Claim 14, as amended, recites "a component of a plasma *etch* reactor, the component being selected from the group consisting of a plasma confinement ring, a focus ring, a pedestal, a chamber wall, a chamber liner and a gas distribution plate, the component having one or more surfaces exposed to the plasma during processing, the component comprising an as-sprayed plasma sprayed coating on a plasma exposed surface of the component, the coating having an as-sprayed surface roughness that promotes the adhesion of *polymer deposits formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added). Support for the amendments is provided, for example, at page 1, line 2; page 10, lines 1-9; and original Claim 28, of the specification.

Applicants respectfully submit that Ding fails to disclose or suggest the combination of features recited in Claim 14.

Ding discloses a *sputtering chamber* 11 in which materials are *sputter deposited* over substrates. The sputtering chamber 11 includes a screening device 15 positioned between a sputtering target 17 and a semiconductor substrate 19. The screening device 15 blocks obliquely traveling, undesirable particles from reaching the substrate 19 (col. 4, lines 10-21). Ding discloses the formation of a coating 33 on a screening device 15 (see Fig. 3) to promote adhesion between the coating and depositing target particles that impact the coating (col. 3, lines 16-20).

Ding fails to disclose or suggest the combination of features recited in Claim 14, including "a component of a plasma *etch* reactor, ... the component comprising an as-sprayed plasma sprayed coating on a plasma exposed surface of the component, the coating having an as-sprayed surface roughness that promotes the adhesion of *polymer deposits formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added). Ding does not disclose or suggest a plasma etch reactor, much less a component of a plasma etch reactor. In addition, Ding does not disclose or suggest a component of a plasma etch reactor "comprising an as-sprayed plasma sprayed coating on a plasma exposed surface of the component, the coating having an as-sprayed surface roughness that promotes the adhesion of *polymer deposits formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added). For these reasons, the subject matter recited in Claim 14 is patentable over Ding.

Claims 19 and 20 depend from Claim 14 and, accordingly, also are patentable over Ding for at least the same reasons that Claim 14 is patentable.

Claim 34 recites "a component of a *plasma etch reactor* ... having one or more surfaces exposed to the plasma during processing, the component comprising a coating ... being (i) a ceramic material comprising at least one material selected from the group consisting of yttria, alumina, zirconia, silicon carbide and boron carbide or (ii) a metallic material, the coating having an as-sprayed surface roughness that promotes the adhesion of *polymer deposits formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added). Applicants respectfully submit that the subject matter recited in Claim 19 also is patentable over Ding for reasons stated above with respect to Claim 14.

Withdrawal of the rejection is respectfully requested.

3. **Rejection of Claims 14-17, 19-21, 25-29, 31-33, 35 and 36
under 35 U.S.C. §103**

Claims 14-17, 19-21, 25-29, 31-33, 35 and 36 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,916,454 to Richardson et al. ("Richardson") in view of Ding. The reasons for the rejection are stated at numbered paragraphs 21-45 of the Official Action. The rejection is respectfully traversed.

The Official Action acknowledges that Richardson fails to teach a coating for a plasma chamber part, much less a plasma sprayed coating as recited in Claim 14.

However, it is asserted in the Official Action that it would have been obvious to one having ordinary skill in the art to coat the surface of the chamber walls or gas injection port

of Richardson with the coating disclosed by Ding. Applicants respectfully disagree with these assertions.

As explained above, Ding discloses a particle screening device for a sputtering chamber. Such sputtering device does not suggest a *plasma etch reactor*, in which semiconductor substrates are etched. Accordingly, Ding provides no motivation to modify Richardson's etch chamber to include a component used in a sputtering chamber.

Furthermore, Ding fails to disclose or suggest a component of a plasma etch reactor having an as-sprayed plasma sprayed coating "having an as-sprayed surface roughness that promotes the adhesion of *polymer deposits formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added). As was discussed during the telephonic interview, Ding discloses that the coating 33 preferably comprises the *same material* as the target material sputtered in the chamber and adhered to the coating (col. 5, lines 51-56). This difference is acknowledged in the Interview Summary (Continuation Sheet (PTOL-413)), which states:

Ding specifically teaches that the material making up the plasma sprayed coating should be matched (i.e. the same as) to the material making up particles that are deposited on the surface of the coating during processing, so as to minimize the difference between the coefficient of thermal expansion between the particles and the coating. The applicant's representative pointed out that the instant invention does not require this matching, and thus *it appears that Ding, which teaches the coating and the particles should be the same material, teaches away from embodiments of the instant invention which do not have the coating matched to the deposited particles.* (Emphasis added.)

Richardson discloses that the deposited byproducts result from plasma etching of a substrate 110 in a chamber 102, and particularly that "most of the byproducts ... are

generated through the reaction between the plasma species themselves, between the plasma species and the substrate films and/or between the plasma species and the protective overlying layer (e.g., photoresist)" (Col. 4, lines 47-52; emphasis added). It is not possible to modify the etch chamber of Richardson to include the coating disclosed in Ding because the coating is the same material as that to be sputter deposited on a substrate. Thus, it would not be possible to modify Richardson to achieve the claimed component of a plasma etch reactor. For these reasons, it is respectfully submitted that the combination of features recited in Claim 14 is patentable over Richardson and Ding.

Claims 15, 19, 20, 25-29, 31-33 and 36 depend from Claim 14 and, accordingly, also are patentable over Richardson and Ding for at least the same reasons that Claim 14 is patentable.

Independent Claim 16 recites "a component of a *plasma etch reactor* ... comprising an as-sprayed plasma sprayed coating of a ceramic material or a metallic material on a plasma exposed surface of the component, the coating having an as-sprayed surface roughness that promotes the adhesion of *polymer deposits formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added). Applicants respectfully submit that the combination of features recited in Claim 16 also is patentable over Richardson and Ding for reasons stated above.

Claim 35 depends from Claim 16 and, accordingly, also is patentable over Richardson and Ding for at least the same reasons that Claim 16 is patentable.

Independent Claim 17 recites "a component of a *plasma etch reactor* ... comprising an as-sprayed plasma sprayed coating of a ceramic material or a metallic material on a

plasma exposed surface of the component, the coating having an as-sprayed surface roughness that promotes the adhesion of *polymer deposits formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added). Applicants respectfully submit that the combination of features recited in Claim 17 also is patentable over Richardson and Ding for reasons stated above.

Independent Claim 21 recites "a component of a *plasma etch reactor* ... comprising an as-sprayed plasma sprayed coating on a plasma exposed surface of the component, *the component and the coating both comprising the same ceramic material* selected from the group consisting of alumina, yttria, zirconia, silicon carbide, silicon nitride, boron carbide and boron nitride, and the coating having an as-sprayed surface roughness that promotes the adhesion of polymer deposits *formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added). Richardson and Ding fail to disclose or suggest the subject matter recited in Claim 21 for the following reasons.

As explained above, neither Richardson nor Ding discloses a component of a plasma etch reactor including an as-sprayed plasma sprayed coating having "an as-sprayed surface roughness that promotes the adhesion of polymer deposits *formed during etching of semiconductor substrates in the plasma etch reactor*" (emphasis added).

Furthermore, Ding fails to disclose or suggest the feature of "the component and the coating both comprising the *same ceramic material*" (emphasis added), as recited in Claim 21. Ding discloses that the porosity of the coating 33 allows atoms within the coating to reposition easily and thereby relieve thermal stress, which results as the particle screening device 15 and coating expand and contract at different rates "due to the difference (i.e.,

mismatch) in coefficients of thermal expansion between the material of particle screening device 15 (e.g., titanium) and the material of coating 33 (e.g., aluminum)" (col. 5, line 57 - col. 6, line 6). In other words, Ding discloses that the material of the particle screening device and the material of the coating are *different*. This further difference between the claimed component and Ding was also discussed during the telephonic interview and is acknowledged in the Interview Summary (Continuation Sheet (PTOL-413)), as follows:

In particular, it was noted that Ding et al. is directed towards coating a plasma chamber part with a plasma sprayed coating, wherein the plasma sprayed coating is designed to have a *different coefficient of thermal expansion* then [sic] the material making up the chamber part" (emphasis added).

Accordingly, because Ding discloses that the coating and the particle screening device are of different materials, it is respectfully submitted that Ding teaches away from the feature of "the component and the coating both comprising the same ceramic material," as recited in Claim 21. Thus, Applicants respectfully submit that Claim 21 also is patentable over Richardson and Ding.

Withdrawal of the rejection is respectfully requested.

4. Rejection of Claim 39 under 35 U.S.C. §103

Claim 39 stands rejected under 35 U.S.C. § 103(a) over Ding in view of Richardson. The reasons for the rejection are stated at numbered paragraphs 46-49 of the Official Action. The rejection is respectfully traversed.

Claim 39 depends from Claim 34. As explained above, Ding and Richardson fail to disclose or suggest the subject matter recited in Claim 34. Accordingly, Claim 39 is

patentable for at least the same reasons that Claim 34 is patentable. Withdrawal of the rejection is respectfully requested.

5. Rejection of Claim 22 under 35 U.S.C. §103

Claim 22 stands rejected under 35 U.S.C. § 103(a) over Richardson in view of Ding, and further in view of U.S. Patent No. 6,120,640 to Shih et al. ("Shih"). The reasons for the rejection are stated at numbered paragraphs 50-54 of the Official Action.

Without addressing the combination of features recited in Claim 22, Shih fails to cure the omissions of Richardson and Ding regarding the combination of features recited in Claim 14, from which Claim 22 depends. Accordingly, the subject matter of Claim 22 also is patentable over the cited references. Withdrawal of the rejection is respectfully requested.

6. Conclusion

For the foregoing reasons, Applicants respectfully submit that the application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

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